New Species of the Southern African Genus *Geissorhiza* (Iridaceae: Ixioideae)

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ABSTRACT. Three new species are recognized in the southern African *Geissorhiza*, a genus now including 84 species. *Geissorhiza silenoides* and *G. rupicola* are members of subgenus *Geissorhiza* and occur in the Ceres District of the southwestern Cape, South Africa. Both have pale pink flowers with unusually long perianth tubes for the genus. *Geissorhiza silenoides* is additionally distinguished by having unequal stamens, each filament being of a different length, scabrid-puberulent stems, and leaves with heavily thickened margins and midribs. *Geissorhiza rupicola* has unusual soft-textured corm tunics and, like *G. silenoides*, has leaves with strongly thickened margins and midribs. The third new species, *G. uliginosa*, is restricted to the Swartberg Mountains of the southern Cape and grows on wet cliffs and under waterfalls. It stands out in the genus in having the flowers solitary on the stems, and very soft-textured corm tunics that rapidly decay, sometimes leaving the corms apparently without tunics. All three new species occur in the southern and southwestern part of southern Africa, a region known for the richness and diversity of its flora, particularly of geophytes.

More than half of the estimated 1750–1800 species of the petaloid monocot family, Iridaceae, occur in southern Africa (Goldblatt, 1994). The region is well known botanically, yet despite over 250 years of botanical exploration, novelties continue to be discovered there. Although the family is a numerically significant element of the flora of a large part of southern Africa, Iridaceae are most diverse in the southern and western coastal belt and adjacent mountains of the subcontinent, a region of mediterranean-type climate with winter rainfall and summer drought. Three new species of *Geissorhiza*, a genus virtually restricted to the winter rainfall zone of southern Africa, are described here. Some 81 species were admitted to the genus when it was last revised (Goldblatt, 1985), and the new species described here thus bring the total to 84. *Geissorhiza* is a member of Iridaceae subfamily Ixioideae, the largest of the four subfamilies currently recognized in Iridaceae (Goldblatt, 1990, 1991). It is one of the largest genera of the subfamily and one of the larger genera in the southern African flora. One of the new species, *G. uliginosa*, belongs in subgenus *Weihea*, which is characterized by concentric corm tunics, and *G. silenoides* and *G. rupicola* are members of subgenus *Geissorhiza*, species of which have the characteristic imbricate corm tunics that inspired the generic name, a Greek word meaning tiled root.

1. Geissorhiza silenoides Goldblatt & J. C. Manning, sp. nov. TYPE: South Africa. Western Cape: Ceres District, lower slopes of Gydo Pass, 20 Sep. 1993, *Goldblatt & Manning 9739* (holotype, NBG; isotypes, K, MO, PRE, WAG). Figure 1A.

Plantae 20–30 cm altae, cormo 5–7 mm diametro tunicis duris imbricatis, foliis linearibus 1.2–1.5 mm latis marginibus costisque incrassatis, spica 4–7 florum, floribus pallide roseis, tubo perianthii cylindrico 15–17 mm longis, tepalis subaequalibus 12.5–14 × 6–7 mm, filamentis inaequalibus 4, 7 et 9 mm longis, antheris ca. 4.5 mm longis, stylo eccentrico.

Plants 20–30 cm high. *Corm* ± ovoid, 5–7 mm diam., flattened slightly below on one side, the tunics woody, blackish, imbricate, the layers breaking below into triangular points. *Cataphylls* membranous, the upper light purple above the ground. *Leaves* 4, the lower 2 basal and longest, reaching to at least the middle of the stem, sometimes to the base of the spike, straight and erect or trailing, the blades linear, 1.2–1.5 mm wide, oval in section with 2 narrow grooves on each surface, the midrib much thickened, the margins raised and arched over the surface, the upper leaves cauline, sheathing for at least half their length, the blades like the basal, the uppermost sometimes only 9–12 mm long and en-

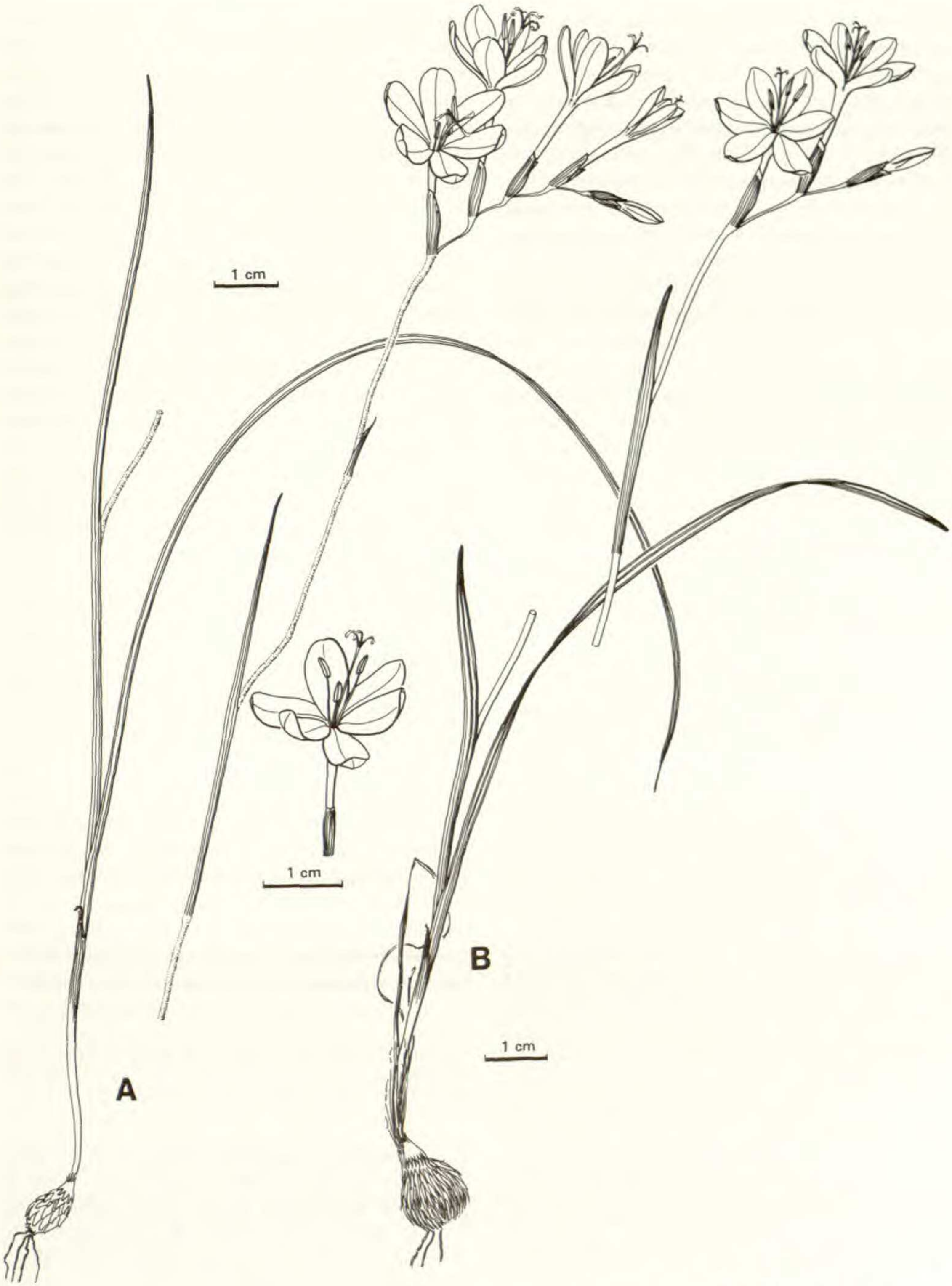

Figure 1. Whole plants and floral details of (A) *Geissorhiza silenoides* Goldblatt & J. C. Manning (*Goldblatt & Manning 9739*) and (B) *G. rupicola* Goldblatt & J. C. Manning (*Esterhuysen 36197*). Drawn by John Manning.

tirely sheathing. *Stem* erect below, flexed above the sheaths of the 2 upper leaves and inclined above, unbranched, minutely scabrid-puberulent. *Spike* flexuose, drooping in bud, 4–7-flowered; *bracts* unequal, the outer pale green, the upper margins pinkish purple, 7–10 mm long, the inner about two-thirds as long, transparent with 2 green keels. *Flowers* hypocrateriform, actinomorphic, pale pink, darker toward the tepal margins, the center becoming whitish, unscented; *perianth tube* cylindric, 15–17 mm long; *tepals* subequal, obovate, 12.5–14 × 6–7 mm, when fully open spreading at right angles to the tube. *Filaments* unequal, inserted ca. 2 mm below the apex of the tube, 4, 7, and 9 mm long, straight and erect; *anthers* ca. 4.5 mm long, cream, the pollen pale yellow. *Ovary* ovoid, ca. 2 mm long; *style* exceeding the anthers by 2–4 mm, the branches unusually long, 5–6 mm long, recurving. *Capsules* and *seeds* unknown.

Flowering September to mid October.

Etymology. The species is named for the resemblance of the flowers to those of some southern African species of *Silene* (Caryophyllaceae), a species of which grows near *Geissorhiza silenoides* and has flowers of nearly the same pink color.

Distribution and habitat. *Geissorhiza silenoides* is evidently restricted to the Ceres District of Western Cape Province, South Africa, an area that is relatively well explored botanically. Only two collections of the species are known, suggesting that it is rare and extremely local in distribution. The type collection was made along a roadside cutting on the south-facing lower mountain slopes of Gydo Pass, and the other collection, made in 1924, is without precise location. The slopes of Gydo Pass have a relatively high rainfall and soils of heavy clay derived from shales of the Bokkeveld Shale Series. These slopes are normally densely clothed with fynbos vegetation dominated by the arborescent *Protea laurifolia* Thunberg, and a dense ground cover and little open ground where geophytes can grow. Geophytes are, however, fairly common and diverse there and appear in profusion after fire or clearing of the bush, such as along the road verges, where there were extensive populations of *G. silenoides* growing together with *Hesperantha bachmannii* Baker, also Iridaceae. We suspect that *G. silenoides* may occur elsewhere in similar habitats along the lower mountain slopes of the ranges north and east of Ceres, where the same vegetation and soils occur. After fire, the slopes adjacent to Gydo Pass should be explored for additional populations of *G. silenoides*.

The blackish imbricate corm tunics regularly notched below into blunt triangular segments place *Geissorhiza silenoides* in subgenus *Geissorhiza*, one of two subgenera recognized by Goldblatt (1985). Within the subgenus, this species stands out in the scabrid-puberulent stems, short leaves with heavily thickened margins and midribs, thus with two narrow grooves on each surface, and in the flowers. The pale pink perianth color is unusual in subgenus *Geissorhiza*, although it is known in a few species of sections *Geissorhiza* and *Monticola*. The most distinctive floral features of *G. silenoides* are the long perianth tube combined with the unequal stamens, each filament being of a different length. Unequal filaments occur sporadically in subgenus *Geissorhiza*, although typically only one filament is short and the remaining two are equal. The combination of long tube and unequal stamens is known only in section *Monticola*, but most members of this section have soft-textured corm tunics and only one, *G. scopulosa* Goldblatt, has puberulous stems (Goldblatt, 1985). In section *Geissorhiza* unequal filaments also occur in some species, and although hard-textured corm tunics and leaves with thickened margins and midribs are typical of this section, a long perianth tube is not. Sectional placement of *G. silenoides* is somewhat uncertain, but we tentatively suggest that *G. silenoides* has its closest relatives among the species of section *Monticola*. Because of its unusual combination of derived features, its immediate relatives are uncertain.

Geissorhiza silenoides is undoubtedly *Geissorhiza* sp. 1 (Goldblatt, 1985), listed as such because of the inadequate material known at the time. The single sheet, collected by F. A. Rogers in 1924, comprises two specimens that are rather poorly pressed. Nevertheless, the scabrid-puberulent stems, leaves with thickened margins and midribs, and flowers with long perianth tubes are clearly evident.

Paratype. SOUTH AFRICA. **Western Cape:** 3319 (Worcester) "Ceres," (possibly the town itself or the district) (?AD), Sep. 1924, *Rogers 28746* (Z).

2. Geissorhiza rupicola Goldblatt & J. C. Manning, sp. nov. TYPE: South Africa. Western Cape: Mosterthoek Twins, Green Gullies Kloof, ca. 1250 m, 9 Dec. 1984, *Esterhuysen 36197* (holotype, BOL; isotypes, MO, NBG, PRE, WAG). Figure 1B.

Plantae (10–)15–20 cm altae, cormo 9–12 mm diametro tunicis mollibus, foliis (2–)3 linearibus 1.5–3 mm latis marginibus costisque forte incrassatis, spica (1–)2–6 florum, floribus pallide roseis, tubo perianthii cylindricis (16–)19–23 mm longis, tepalis subaequalibus 12–15 × 4.5–5.5 mm, filamentis ca. 8 mm longis aequalibus, antheris ca. 3.5 mm longis, stylo eccentrico.

Plants (10–)15–20 cm high. *Corm* 9–12 mm diam., globose, the tunics initially unbroken, soft and papery, becoming torn into narrow vertical strips, ultimately almost fibrous. *Cataphylls* usually dry and brown at flowering time, usually persisting and accumulating around the stem base as a neck of dry brittle fibers. *Leaves* (2–)3, the lower one or two basal, the lowermost longest, reaching to between the upper third of the stem and the base of the spike, the second of the basal leaves usually much shorter, and sheathing in the lower half, the blades linear, 1.5–3 mm wide, the margins and midribs heavily thickened and raised into wings overarching the laminar surfaces, uppermost leaf inserted on the mid to upper part of the stem, smaller than the basal, sheathing for at least half its length, sometimes entirely. *Stem* ascending or drooping from cracks in steep rock faces, smooth, unbranched. *Spike* (1–)2–6-flowered, flexuose; *bracts* subequal, the outer pale green entirely or purple toward the apices, 8–11 mm long, the inner membranous narrower than the outer, two keeled, forked in the upper 1–2 mm. *Flowers* pale pink, actinomorphic, unscented; *perianth tube* cylindric, (16–)19–23 mm long; *tepals* subequal, ovoid-oblong, spreading at right angles to the tube, 12–15 × 4.5–5.5 mm. *Filaments* ca. 8 mm long, exserted ca. 6 mm from the tube; *anthers* ca. 3.5 mm long, cream, the pollen yellow. *Ovary* oblong, 2–3 mm long; *style* eccentric, dividing at or beyond the anther apices, ultimately exceeding the anthers by ca. 4 mm, the branches ca. 2 mm long. *Capsules* globose, 4–6 mm long; *seeds* prismatic, the angles ridged, brown, ca. 1.5 mm at the longest axis.

Flowering late November to early December.

Etymology. From the Latin "rupicola," favoring rocky habitats.

Distribution and habitat. *Geissorhiza rupicola* is known only from moist shady sites on Mosterthoek Twins, a mountain at the western end of the Langeberg Mountains, in the Ceres District of Western Cape Province, South Africa. Plants are confined to moist sites, where they grow in thin soil on rocks, sometimes in cracks in steep cliffs. Such habitats are uncommon as late in the year as November and December in the summer dry Western Cape. *Geissorhiza rupicola* joins a small number of species of this genus, mostly of section *Monticola*, that favor montane habitats and flower late in the season in sheltered sites. The species was discovered by the Cape botanist Elsie Esterhuysen, who has made an extraordinary contribution to the knowledge of the mountain flora of the southern and western Cape.

Geissorhiza rupicola stands out in the genus in its unusually long perianth tube, 2–2.5 times as long as the tepals and 16–22 mm long. A tube of this length is also known in *G. grandiflora* Goldblatt, but this species has longer tepals and unequal stamens, one filament of which is shorter than the other two. *Geissorhiza silenoides* also has an unusually long perianth tube but can immediately be distinguished from *G. rupicola* by its puberulous stem, hard imbricate corm tunics, and unequal stamens.

Paratype. SOUTH AFRICA. **Western Cape:** 3319 (Worcester) Mosterthoek Twins, Green Gullies Kloof, ca. 1250 m (4000 ft.) (AD), 18 Dec. 1988 (fr), *Goldblatt 7483* (BOL, MO, NBG).

3. Geissorhiza uliginosa Goldblatt & J. C. Manning, sp. nov. TYPE: South Africa. Western Cape: Oudtshoorn District, Swartberg Mountains, stream E of Gouekrans Hiking Trail hut (AC), 15 Jan. 1989, *Vlok 2075* (holotype, NBG; isotype, MO). Figure 2.

Plantae 15–30 cm altae, cormo reducto 3–5 mm diametro, foliis 5, laminibus planis marginibus costisque leviter incrassatis, floris solitariis, floribus roseis vel purpureis, tubo perianthii infundibuliformis 9–13 mm longis, tepalis subaequalibus 20–22 × 9–11 mm, filamentis 12–14 mm longis aequalibus, antheris 7–9 mm longis, stylo declinato.

Plants 15–30 cm high. *Corm* very reduced, 3–5 mm diam., the tunics light brown, soft-textured, not accumulating with age. *Cataphylls* rapidly decaying, membranous. *Leaves* usually at least 5, the lower 3 basal and longest, usually shorter than the stems but trailing, the blades plane with lightly thickened margins and midribs, the cauline leaves shorter than the basal, largely or entirely sheathing. *Stem* drooping, usually with at least one, sometimes up to four branches. *Spike* 1-flowered; *bracts* green, the margins often red, the outer 16–20 mm long, the inner about as long as or slightly shorter than the outer. *Flowers* funnel-shaped, actinomorphic, pale pink to purplish, cream in the throat, the base of the tepals dark pink, unscented; *perianth tube* narrowly funnel-shaped, 9–13 mm long; *tepals* ovate-oblong, subequal, 20–22 × 9–11 mm, subpatent when fully open. *Filaments* 12–14 mm long, equal in length, unilateral; *anthers* 7–9 mm long, dark brown, the pollen brownish. *Ovary* ovoid, 3–4 mm long; *style* declinate, extended below the filaments, the branches ca. 4 mm long. *Capsules* and *seeds* unknown.

Flowering December and January.

Etymology. Named for the moisture-loving conditions the species requires, "*uliginosa*," the Latin adjective describing such habitats.

Distribution and habitat. *Geissorhiza uliginosa*

Figure 2. Whole plant and floral details of *Geissorhiza uliginosa* Goldblatt & J. C. Manning (*Vlok 881* and *2075*). Drawn by John Manning.

is restricted to waterfalls and wet cliffs in the Swartberg Mountains of the southern part of Western Cape Province, South Africa. Plants are known from only a few localities in this semiarid area of low and predominantly winter rainfall. The species joins a handful of others in the genus that favor this specialized habitat, e.g., *G. cataractarum* Goldblatt, *G. elsiae* Goldblatt, and *G. outeniquensis* Goldblatt. The species was discovered by the South African botanist J. H. J. Vlok, who made the first two collections in the summer of 1984–1985.

Despite the similar habitats favored by *Geissorhiza uliginosa* and the species mentioned above, the relationships of *G. uliginosa* appear to lie not with any of these other moisture-loving, cliff-dwelling species, but with another species of the southern Western Cape, *G. fourcadei* (L. Bolus) G. Lewis. That species grows in thin soils on rock outcrops in the mountains of the southern Cape, and it flowers mainly in the autumn, February to May. Like *G. fourcadei*, *G. uliginosa* has pale pink flowers and branched stems, each of which bears just a single flower. *Geissorhiza uliginosa* differs in having flowers with a shorter perianth tube, 9–13 mm long, plane leaves, and soft-textured short-lived corm tunics. This contrasts with the longer perianth tube, (8–)17–20 mm long, xeromorphic terete, four-grooved leaves, persistent fibrous cataphylls, and larger corms with persistent firm-papery corm tunics of *G. fourcadei*.

Paratypes. SOUTH AFRICA. **Western Cape:** 3321 (Ladismith) Swartberg Mountains, along road to Gamkakloof at Waterfall Kloof (DC), 5 Dec. 1985, *Goldblatt 7455* (MO). 3322 (Oudtshoorn) upper N-facing slopes of Waboomsberg in perennial waterfall, ca. 4800 ft. (AC), 26 Dec. 1984, *Vlok 881* (MO, NBG); lower southern slopes of the Swartberg at Rust-en-Vrede, cliffs next to waterfall (AD), 20 Jan. 1985, *Vlok 894* (MO).

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